Amendments to the Claims

Claims:

1-16. (canceled)

17. (Currently amended) A clock signal extraction device for extracting an extracted clock signal out of a periodic data signal, comprising:

- a first clock generator circuit configured to generate a rising edge clock signal, the first clock generator circuit having a first output;
- a first phase detector configured to detect a first phase difference between a rising edge of the periodic data signal and a rising edge of the rising edge clock signal, the first phase detector having a first input connected to the first output to form a first loop, and wherein the first clock generator circuit and the first phase detector cooperate to reduce the detected first phase difference,
- a second clock generator circuit configured to generate a falling edge clock signal, the second clock generator circuit having a second output;
- a second phase detector configured to detect a second phase difference between a falling edge of the data signal and a falling edge of the falling edge clock signal, the second phase generator having a second input connected to the second output to form a second loop, and wherein the second clock generator circuit and the second phase detector cooperate to reduce the detected second phase difference;
- a third clock generator circuit configured to generate the extracted clock signal ~~based on an average of the first phase difference and the second phase difference such that the probability distribution functions of the rising edges and falling edges of the periodic data signal are individually averaged~~ and a controller comprising a phase pump and a loop filter configured to control the third clock generator based on an average of the first phase difference and the second phase difference.

18. (Currently amended) The clock signal extraction device according to claim 17, wherein ~~the third clock generator circuit includes a controller and a third clock generator,~~ the controller

is configured to process said first phase difference and said second phase difference to control generation of the extracted clock signal by the third clock generator.

19. (Previously presented) The clock signal extraction device according to claim 18, wherein the controller further constitutes a part of the first clock generator circuit and the second clock generator circuit.

20. (Previously presented) The clock signal extraction device according to claim 19, wherein each of said first, second and third clock generator circuits includes a voltage controlled oscillator.

21. (Previously presented) The clock signal extraction device according to claim 17, wherein each of said first, second and third clock generator circuits includes a voltage controlled oscillator.

22. (Previously presented) The clock signal extraction device according to claim 17, wherein each of the first, second and third clock generator circuits includes a phase pump and a loop filter.

23. (Previously presented) The clock signal extraction device according to claim 19, wherein the controller further comprises, for each of the first, second and third clock generator circuits, a phase pump and a loop filter.

24. (Currently amended) An arrangement for extracting data, including:

a clock signal extraction device for extracting an extracted clock signal out of a periodic data signal, comprising

a first clock generator circuit configured to generate a rising edge clock signal, the first clock generator circuit having a first output,

a first phase detector configured to detect a first phase difference between a rising edge of the periodic data signal and a rising edge of the rising edge clock signal, the first

phase detector having a first input connected to the first output to form a first loop, and wherein the first clock generator circuit and the first phase detector cooperate to reduce the detected first phase difference,

a second clock generator circuit configured to generate a falling edge clock signal, the second clock generator circuit having a second output;

a second phase detector configured to detect a second phase difference between a falling edge of the data signal and a falling edge of the falling edge clock signal, the second phase generator having a second input connected to the second output to form a second loop, and wherein the second clock generator circuit and the second phase detector cooperate to reduce the detected second phase difference,

a third clock generator circuit configured to generate the extracted clock signal and a controller comprising a phase pump and a loop filter configured to control the third clock generator based on an average of the first phase difference and the second phase difference ~~based on an average of the first phase difference and the second phase difference such that the probability distribution functions of the rising edges and falling edges of the periodic data signal are individually averaged~~; and

a data extraction device configured to extract data from said data signal according to a rate of said extracted clock signal.

25. (Currently amended) The arrangement according to claim 24, wherein the ~~third clock generator circuit includes a controller and a third clock generator, the~~ controller is configured to process said first phase difference and said second phase difference to control generation of the extracted clock signal by the third clock generator.

26. (Previously presented) The arrangement according to claim 25, wherein said controller controls said third clock generator to generate said clock signal such that the error rate of the extracted data is minimized.

27. (Previously presented) The arrangement according to claim 24, wherein said data extraction device comprises a data sampler for sampling said data signal.

28. (Previously presented) The arrangement according to claim 27, wherein said data sampler comprises a D-type flip-flop.

29. (Currently amended) A method for extracting an extracted clock signal out of a periodic data signal, comprising:

(a1) generating a rising edge clock signal;

(a2) detecting a first phase difference between a rising edge of the periodic data signal and a rising edge of a rising edge clock signal;

(a3) feeding back the first phase difference to generate a subsequent rising edge clock signal having a reduced first phase difference;

(b1) generating a falling edge clock signal;

(b2) detecting a second phase difference between a falling edge of the periodic data signal and a falling edge of a falling edge clock signal;

(b3) feeding back the second phase difference to generate a subsequent falling edge clock signal having a reduced second phase difference; and

(c) generating the extracted clock signal and controlling the extracted clock signal based on an average of ~~a plurality of~~ the first phase ~~differences~~ difference and the second phase ~~differences~~ difference ~~in a way that the probability distribution functions of the rising edges and falling edges of the periodic data signal are individually averaged~~ using a phase pump and a loop filter.

30. (Previously presented) The method according to claim 29, where step (a1) includes employing a voltage controlled oscillator to generate the first clock signal and the subsequent first clock signal.

31. (Previously presented) The method according to claim 30, where step (a2) includes employing a voltage controlled oscillator to generate the second clock signal and the subsequent second clock signal.

32. (Previously presented) The method according to claim 29, further comprising a step of: extracting data from said data signal according to a rate of said extracted clock signal.

33. (Previously presented) The method according to claim 32, wherein step c) further comprises generating the extracted clock signal such that the error rate of said extracted data is minimized.

34. (Previously presented) The method according to claim 33, wherein said data signal is an optical data signal.

35. (Previously presented) The method according to claim 33, further comprising extracting data from said data signal using a flip-flop.

36. (Previously presented) The method according to claim 29, wherein said data signal is an optical data signal.